Someone is Pulling the Strings: Hypersensitive Agency Detection and Belief in Conspiracy Theories

Karen M. Douglas*, Robbie M. Sutton, Mitchell J. Callan,

Rael J. Dawtry and Annelie J. Harvey

Author notes:

* Karen M. Douglas, School of Psychology, University of Kent, Canterbury, CT27NP, United Kingdom. Ph: +44 1227 824758. Email: k.douglas@kent.ac.uk.

Robbie M. Sutton, School of Psychology, University of Kent, Canterbury, CT27NP, United Kingdom. Ph: +44 1227 823080. Email: r.sutton@kent.ac.uk.

Mitchell J. Callan, Department of Psychology, University of Essex, Colchester, CO43SQ. Ph: +44 1206 873817, Email: mcallan@essex.ac.uk.

Rael J. Dawtry, School of Psychology, University of Kent, Canterbury, CT27NP, United Kingdom. Ph: +44 1227 823181. Email: rd299@kent.ac.uk.

Annelie J. Harvey, Department of Psychology, Anglia Ruskin University, Cambridge, CB11PT. Ph: +44 8451 962731, Email: annelie.harvey@anglia.ac.uk.

* Corresponding author

Abstract

We hypothesized that belief in conspiracy theories would be predicted by the general tendency to attribute agency and intentionality where it is unlikely to exist. We further hypothesized that this tendency would explain the relationship between education level and belief in conspiracy theories, where lower levels of education have been found to be associated with higher conspiracy belief. In Study 1 (N=202) participants were more likely to agree with a range of conspiracy theories if they also tended to attribute intentionality and agency to inanimate objects. As predicted, this relationship accounted for the link between education level and belief in conspiracy theories. We replicated this finding in Study 2 (N=330), whilst taking into account beliefs in paranormal phenomena. These results suggest that education may undermine the reasoning processes and assumptions that are reflected in conspiracy belief.

Keywords:

Conspiracy theories, hypersensitive agency detection, intentionality bias, paranormal beliefs, education

Someone is Pulling the Strings: Hypersensitive Agency Detection and Belief in Conspiracy Theories

Conspiracy theories are attempts to explain the ultimate causes of events as secret plots by powerful and malevolent groups rather than as overt activities or natural occurrences (Byford, 2011; McCauley & Jacques, 1979; Sunstein & Vermeule, 2009). For example, popular conspiracy theories suppose that the 9/11 attacks on the Twin Towers were an 'inside job' (Swami, Chamorro-Premuzic & Furnham, 2010; Wood & Douglas, 2013), that Princess Diana was murdered by elements within the British establishment (Douglas & Sutton, 2008; 2011), that climate change is a hoax (Jolley & Douglas, 2014a; Lewandowsky, Oberauer & Gignac, 2013) and that Lee Harvey Oswald acted on behalf of the CIA in assassinating U.S. President John F. Kennedy (McCauley & Jacques, 1979; McHoskey, 1995). Conspiracy theories are a prominent characteristic of contemporary culture, aided by the ease and speed of Internet communication (Coady, 2006). They capture public interest, typically drawing attention away from official explanations in favour of elaborate plots and schemes.

Some conspiracy theories may have positive consequences. For example, they may allow individuals to question social systems and in turn encourage government transparency (e.g., Clarke, 2002; Fenster, 1999; Swami & Coles, 2010). They may also reveal inconsistencies in official accounts of events (e.g., Clarke, 2002) uncovering new information for examination (Miller, 2002). However, recent research suggests that conspiracy theories may also have detrimental effects on health decisions, political engagement, and pro-environmental behavior. For example, exposure to anti-vaccine conspiracy theories decreases people's intentions to vaccinate (Jolley & Douglas, 2014b), an effect mediated by feelings of powerlessness, disillusionment and mistrust. Further, belief in the theory that birth control and HIV/AIDS are forms of genocide against

African Americans is associated with negative attitudes toward contraception (Bird & Bogart, 2003; Bogart & Thorburn, 2006). Also, exposure to anti-government and climate change conspiracy theories has been found to negatively influence political engagement and pro-environmental intentions respectively, effects explained by feelings of powerlessness (Jolley & Douglas, 2014a).

With both the positive and negative consequences of conspiracy theories in mind, it is important to understand the psychological factors associated with conspiracy belief. In recent years, psychologists have made significant progress in understanding these factors. For example, people are likely to believe in a particular conspiracy theory if they also believe in others (Goertzel, 1994). This phenomenon occurs even when conspiracy theories contradict each other (Sutton & Douglas, 2014; Wood, Douglas & Sutton, 2012). Also, researchers have uncovered a range of individual differences and personality variables associated with conspiracy belief, such as anomie, distrust in authority, political cynicism, powerlessness (Abalakina-Paap, Stephan, Craig & Gregory, 1999; Goertzel, 1994; Swami et al., 2011), Machiavellianism (Douglas & Sutton, 2011) and schizotypy (Darwin, Neave & Holmes, 2011). The growing psychological 'profile' of the typical conspiracy believer therefore appears to be that of a morally deficient, psychologically deficient and cynical individual (e.g., Groh, 1987; Plomin & Post, 1997).

However, this picture is rather too negative and simplistic given the popularity of conspiracy theories in the general population. Also, whilst previous research provides valuable insight into the personality characteristics of people who are prone to conspiracist ideation, it provides little information about the cognitive mechanisms that lead to conspiracist ideation, and therefore the cognitive mechanisms that are likely to enable people to resist the conspiracy theories that may be harmful. Recently, social scientists have focused more on what these psychological processes, cognitive biases and

thinking styles might be. For example, Douglas and Sutton (2011) found that the psychological process of projection contributes to conspiracy belief, in that people endorsed conspiracy theories more when they felt they themselves would be willing to conspire. van Prooijen and Jostmann (2013) found that inducing uncertainty led people to heightened conspiracy belief. Further, Brotherton and French (2014) found that people who endorsed conspiracy theories were more likely to commit the conjunction fallacy – the tendency to overestimate the likelihood of co-occurring events (Tversky & Kahneman, 1983). Belief in conspiracy theories may also be in part a result of the proportionality bias – the tendency to attribute small, mundane causes to insignificant events, and large, major causes to more significant events (Leman & Cinnirella, 2007; van Prooijen & van Dijk, 2014). Further, conspiracy beliefs have been consistently found to be associated with supernatural beliefs such as religious beliefs and beliefs in the paranormal (e.g., Darwin et al., 2011; Newheiser, Farias & Tausch, 2011; Stieger, Gumhalter, Tran, Voracek & Swami, 2013; Swami, Coles et al., 2013). Belief in conspiracy theories therefore appears to be associated with the way people perceive the world around them, in particular when events are unclear or uncertain.

The view that conspiracy belief can be explained by thinking and reasoning is further underscored by the fact that belief in conspiracy theories has been found to be associated with education level, such that people with higher levels of education tend to be less likely to endorse conspiratorial explanations for events (Bird & Bogart, 2003; Goertzel, 1994; Oliver & Wood, 2014; Uscinski & Parent, 2014). Improving education in digital literacy (Bartlett & Miller, 2011) and in health and science (e.g., Bogart & Thorburn, 2005, 2006) are often cited as methods of overcoming conspiracy theorizing. Some research also points to the more general cognitive benefits of education. For example, when controlling for other natural confounds such as self-selection into further

education, schooling is a significant predictor of IQ (Brinch & Galloway, 2012). Further, between-sibling differences in IQ can be partly explained by learning-to-read age (Ritchie, Bates & Plomin, 2015). Also, some evidence suggests that education correlates negatively (albeit weakly) with irrational beliefs such as attributions of events to fate and the belief in karma (Banerjee & Bloom, 2014). Logical errors and biases in thinking style, including conspiracy belief, may therefore be improved by education.

Another such cognitive bias is *hypersensitive agency detection* (HAD) – the tendency to attribute agency and intentionality where it does not exist or is unlikely to exist (Barrett, 2004, 2007). Research has shown that people commonly interpret the movement of two-dimensional geometric shapes as being intentional and agentic (e.g., Heider & Simmel, 1944; Scholl & Tremoulet, 2000). In the absence of typical indicators of agency such as faces or hands, people describe the movement of shapes as they might normally explain the intentional actions of human beings. Barrett (2004) argued that people do this because the brain is hard-wired to be hypersensitive to agency in the environment. Specifically, since humans have evolved in an environment that contains many agents (e.g., friends, enemies and dangerous predatory animals) hypersensitivity to agency may be adaptive because it makes people wary in their interactions with the environment around them, reducing vulnerability to unexpected outcomes and avoiding risk from potentially dangerous factors (Barrett, 2004; Guthrie, 1993). Being able to detect and understand an event and react quickly, or respond quickly to an ambiguous situation, is important for physical and social survival.

HAD has been used to explain why people believe in the existence of invisible agents such as spirits and gods, and why people are religious (Barrett, 2007). A general tendency to overestimate the presence of other agents reinforces the belief in an omnipresent and invisible supernatural agent (Barrett, 2007). HAD has also been linked

to superstition – the belief that there is a cause and effect between unconnected events (e.g., that a particular number brings good luck; Lanman, 2012). Similarly, although much of human behavior is intentional, researchers have argued that people show a tendency to judge *all* actions of other people to be intentional by default (Rosset, 2008). Further, people are prone to explain natural phenomena (e.g., that some rocks are pointy) as having a purpose (e.g., so that animals do not sit on them) rather than a natural cause (e.g., the composition of the rock piled up over time; Kelemen, 1999). Much of the time individuals are able to override or inhibit these tendencies, but under conditions of limited processing ability, people commonly attribute intentionality where it does not exist and see natural phenomena as having some hidden purpose (Kelemen & DiYanni, 2005; Rosset, 2008).

As is the case for HAD, there is a robust relationship between conspiracy belief and belief in supernatural phenomena (Darwin et al., 2011; Newheiser et al., 2011; Stieger et al., 2013; Swami, Coles et al., 2013). Also, by definition, conspiracy theories assume purpose, agency and intentionality. Specific human agents are implicated either when it is unlikely to have been their responsibility, they are likely to have done nothing, or when the event was most likely the result of an accident. With limited information to understand events, people are likely to attribute intentionality and agency to attempt to make sense of what happened. There is some preliminary evidence to suggest that this indeed occurs. Imhoff and Bruder (2014, Study 4) asked participants to rate their agreement with conspiracy theories and also to complete a scale of individual differences in anthropomorphism – the tendency to attribute human characteristics to anything other than a human being – as a proxy of the tendency to attribute intentionality and agency (Waytz, Cacioppo & Epley, 2010). There was a significant positive relationship between the tendency to anthropomorphize and to believe in conspiracy theories.

In the current paper, we aim to replicate and build upon this finding. Specifically, we argue that the link between HAD and conspiracy belief may have a broader significance. In particular, this thinking style may enable us to explain why individuals with lower levels of education tend to be more likely to endorse conspiracy theories. Specifically, belief in conspiracy theories has been found to be negatively associated with analytic cognitive style, which reflects the propensity to put aside intuitions when engaging in problem solving (Swami, Voracek, Steiger, Tran & Furnham, 2014). Analytic cognitive style, which allows people to reject false inferences that have been based on instincts and hunches (processes arguably very similar to resisting the automatic detection of agency), is positively correlated with education level (Pennycook, Cheyne, Seli, Koehler & Fugelsang, 2012). Further, analytic cognitive style has been found to be negatively correlated with supernatural belief (Pennycook et al., 2012). We know that HAD is associated with belief in the supernatural (Barrett, 2007; Riekki, Lindeman & Raji, 2014) and conspiracy belief (Imhoff & Bruder, 2014), and also that conspiracy belief is associated with supernatural belief (Darwin et al., 2011; Newheiser et al., 2011; Stieger et al., 2013; Swami, Coles et al., 2013). Therefore, people with lower levels of education may be more likely to endorse conspiratorial explanations for events because they also show a greater tendency to attribute intentionality and agency in general. This tendency, and in turn conspiracy theorizing, may be somewhat addressed by education.

In two studies, we examined the association between education, HAD and conspiracy belief. Study 1 (N=202) tested the hypothesis that the tendency to attribute agency and intentionality would predict conspiracy belief, and that it would also explain the relationship between education level and belief in conspiracy theories. Study 2 (N=330) tested the hypothesis that these relationships would hold even when beliefs in paranormal phenomena are taken into account. A range of demographic factors have

also been found to be associated with conspiracy theories, such as age (Swami, 2012), annual income (Bird & Bogart, 2003), religiosity (Furnham, 2013), and political orientation (Furnham, 2013; Oliver & Wood, 2014). Although effects are not consistent across studies and it was therefore difficult to form specific hypotheses concerning these variables, we included them as covariates in our analyses.

Study 1

The first study was designed to replicate Imhoff and Bruder's (2014, Study 4) finding that anthropomorphism and beliefs in conspiracy theories are related. We predicted that the tendency to anthropomorphize would be significantly associated with the tendency to believe popular conspiracy theories, and would explain the relationship between education level and conspiracy beliefs.

To extend on this work, we included an additional task to measure the attribution of intentionality and agency based on the classic study by Heider and Simmel (1944). In this method, participants were asked to watch a video of shapes moving about a screen and were asked to rate the extent to which the shapes display human-like characteristics (e.g., consciousness) and whether their 'behaviors' are the result of human-like characteristics such as free will. This task therefore measures the spontaneous perception of intentionality in the behavior of inanimate objects rather than more general judgments about perceived intentionality. Nevertheless, we could expect responses on this task to be associated with the tendency to anthropomorphize and the tendency to endorse conspiracy theories. We also tentatively predicted that responses on this task would also explain the relationship between education and conspiracy belief.

Method

Participants and Design

Two hundred and two workers from Amazon's Mechanical Turk™ were recruited to complete an online questionnaire (102 women, 99 men, 1 transgender/rather not say, M_{age} = 32.4, *SD* = 12.20). Of this sample, 78% were White/Caucasian, 7% African American, 7% Asian, 5% Hispanic, 0.5% Pacific Islander and 2.5% Other. Fifty one percent indicated that they had no religion or were atheist, 39% were Christian (e.g., Catholic, Baptist, Protestant, Methodist), 3% agnostic, 3% Jewish, 1% Muslim, 1% Buddhist, 1% Hindu and 1% Other (including 'spiritual' and Wiccan). They were each paid US $0.75. The design of the study was correlational. The predictor variables were anthropomorphism, the tendency to attribute intentions to inanimate objects using the Heider and Simmel (1944) task, and a range of demographic factors. The dependent variable was belief in conspiracy theories.

Materials and Procedure

The questionnaire was designed and administered using the Qualtrics questionnaire design software. Participants were first presented with an information page where they were asked to give their informed consent. They were then asked to complete a series of measures in random order, except for the demographic measures which always appeared in the same order at the end of the questionnaire. [1]

Belief in conspiracy theories

Participants were asked to read a series of statements related to well-known conspiracy theories. These were adapted from Douglas and Sutton's (2011) scale. There were seven statements (e.g., "Scientists are creating panic about climate change because it is in their interests to do so"; "The attack on the Twin Towers was not a terrorist action but a governmental plot"; 1 = *strongly disagree*, 7 =*strongly agree*; α = .82).

Perceived intentionality and agency

Participants completed the individual differences in anthropomorphism scale (IDAQ; Waytz et al., 2010). Individual differences in anthropomorphism predict the amount of responsibility that is placed on an agent (Waytz et al., 2010) and as such provide a measure of the extent to which individuals afford animals, objects and situations with the ability to perform actions intentionally. There were 15 questions (e.g., "To what extent does the average mountain have free will?"; "To what extent does the environment experience emotions?"; 1 = *not at all*, 10 = *very much*; $\alpha = .88$).

Participants were also asked to view the animation used by Heider and Simmel (1944) in which three shapes (a large triangle, a small triangle and a small circle) moved around the screen and in and out of an opening and closing rectangular box. The animation was 1:30 minutes long. In the original study using this animation, Heider and Simmel found that the majority of participants described the movement of shapes as they would describe the purposeful behavior of animals and humans. In this original work, participants often created a story about the shapes (e.g., a person chasing another person), the emotions they experienced (e.g., fear, frustration), and their personal characteristics (e.g., bravery, aggression). This task therefore provides an additional opportunity to measure individuals' tendency to perceive intentionality and agency. After viewing the animation, participants were asked to answer some questions about the shapes and the 'behavior' of the shapes. Five questions were asked about the shapes (e.g., "To what extent did you think the shapes were purposeful"; "To what extent did you think the shapes were conscious?", $\alpha = .87$) and five were asked about the 'behavior' of the shapes (e.g., "Did you think the behavior of the shapes was intentional?"; "Did you think the behavior of the shapes was the result of conscious decisions?", $\alpha = .95$; in each case 1 = *not at all*, 5 = *very much*). The two types of questions were significantly correlated,

$r(202) = .72$, $p < .001$. Using oblique rotation (promax), an exploratory factor analysis revealed one factor explaining 65.15 per cent of the variance. Several of the items cross-loaded onto a smaller second factor (eigenvalue = 1). We therefore combined the two types of questions into a single 10-item scale ($\alpha = .94$). Note however that the two measures of HAD (anthropomorphism and perceived intentionality) were not significantly correlated, $r(202) = .11$, $p = .202$.

Education level

Participants rated their education level on a five-point scale (1 = *no formal education*, 2 = *primary level education*, 3 = *secondary level education*, 4 = *college education, bachelor's degree*, 5 = *college education, graduate degree*).

Demographics

Finally, participants were asked to provide some demographic details. In addition to age, gender, ethnicity and religion, participants were asked to rate their religiosity (1 = *not at all religious*, 2 = *somewhat religious*, 3 = *moderately religious*, 4 = *very religious*). Note that this is a measure of the degree to which participants feel that they are religious (which may include religious practices and behaviors) rather than a measure of religious belief. They also rated their political orientation (1 = *very left-wing*, 2 = *moderately left-wing*, 3 = *slightly left-wing*, 4 = *center*, 5 = *slightly right-wing*, 6 = *moderately right-wing*, 7 = *very right-wing*) to give a measure of political conservatism. They also rated their annual household income within 11 brackets ranging from <$10,000 to $100,000 or more. Finally, they rated their perceived socioeconomic status (1 = *working class*, 8 = *upper class*). At the completion of the questionnaire, participants were debriefed, thanked and paid.

Results and Discussion

Only one person indicated that they were transgender or would rather not say. We therefore examined if there was a gender difference in conspiracy belief between females and males. No such gender difference existed, $t(199) = .81$, $p = .418$ and gender was therefore not included as a factor in further analyses. We also did not analyse results for ethnic or religious differences since numbers were too unequal. Means and standard deviations for all measures, and correlations between variables, are presented in Table 1. There were significant positive correlations between conspiracy belief and anthropomorphism, perceived intentionality, and political conservatism. Conspiracy belief and age were negatively correlated. Conspiracy beliefs were also marginally negatively correlated with education level and annual household income. [2]

We entered all variables into a step-wise regression where Step 1 included demographic variables (R^2 change = .12, $F(5,196) = 6.31$, $p < .001$), Step 2 further included education level (R^2 change = .12, $F(1,195) = 1.40$, $p = .239$), and Step 3 further included anthropomorphism and perceived intentionality (R^2 change = .19, $F(2,193) = 9.60$, $p < .001$). There was no evidence of collinearity (all tolerances > .70 and all VIF < 1.5). Findings of the final model are presented in Table 2. The overall regression model was significant $F(8, 201) = 6.89$, $p < .001$ and accounted for 22% of the variance. As hypothesized, anthropomorphism and perceived intentionality each significantly predicted belief in conspiracy theories. With all variables entered into the regression, age and political conservatism also remained as significant predictors.

The predicted relationship between education level and belief in conspiracy theories was present across the two studies reported in this paper. We proceeded to test whether this was mediated by HAD. To do so, bootstrapped mediation analyses (10,000 resamples) examined the indirect effect of education level on conspiracy belief via

anthropomorphism and perceived intentionality using the PROCESS macro for SPSS (model 4; see Hayes, 2013). Bootstrapping procedures have several advantages over traditionally used parametric approaches such as regression. They make no assumptions about distribution and are more robust up to sample sizes of approximately 1,000. Unlike the traditional approach to testing mediation (Baron and Kenny, 1986), the decision to undertake these tests is not contingent upon observation of significant effects in preliminary tests (see Hayes, 2009, p. 414). This procedure calculates the total and all possible specific indirect effects of the IV on the DV. In this procedure, an indirect effect is estimated as being significant if zero is not contained within the 95% lower (LLCI) and upper (ULCI) confidence intervals. Results are presented in Table 3. Including age, religiosity, political conservatism, annual household income and perceived SES as covariates, there was an indirect effect of education level on belief in conspiracy theories via anthropomorphism but not responses on the Heider and Simmel task.

This study therefore first replicates the finding observed by Imhoff and Bruder (2014) that belief in conspiracy theories are predicted by hypersensitive agency detection in the form of anthropomorphism. In this study, both anthropomorphism and HAD as measured using the Heider and Simmel task predicted the extent to which participants endorsed conspiracy theories. We also found support for the hypothesis that HAD mediates the relationship between education level and belief in conspiracy theories. Individuals with higher levels of education were less likely to be hypersensitive to agency (but only in the form of anthropomorphism) and were therefore less likely to believe in conspiracy theories.

It should be explained why the effect was observed for anthropomorphism but not for perceived intentionality as measured by the Heider and Simmel task. It may be the case that although they both provide a measure of HAD that is associated with

conspiracy belief, they are nevertheless measuring subtly different phenomena. Crucially, the tendency to attribute intentionality to the movement of shapes was not associated with education and did not mediate the relationship between education level and conspiracy belief. There is one reason why this may be the case. In contrast to anthropomorphism, the Heider and Simmel task asks respondents to make an immediate judgment of causality about behavior they have just observed, rather than a more general judgment about hidden intentionality. Perhaps education suppresses more immediate judgments of causality but not teleological thinking more generally (Kelemen, 2004). Specifically, it may be the case that the Heider and Simmel task taps into people's tendency to impute intention onto a specific, concrete situation. Judgments on this task may reflect errors in reasoning less so than responses to the anthropomorphism scale, which measures judgments of dispositions possessed by many features of the non-human world (e.g., the weather, animals). The broader set of judgments may be a clearer reflection of thinking that can be influenced by long-term educational benefits. [3]

Study 2

In Study 2, we aimed to replicate and extend these findings. We again examined the extent to which HAD mediates the link between education and belief in conspiracy theories. We also examined the extent to which HAD predicts conspiracy belief independently of a specific type of irrational belief – the belief in paranormal phenomena. If education simply makes people more equipped to be rational thinkers, then education should negatively predict conspiracy belief. Also, the effect of education on conspiracy belief should be mediated by both HAD and paranormal belief. However, if the attribution of intentionality reflects a unique aspect of thinking style that predicts conspiracy belief, we would expect only HAD (and not paranormal belief) to mediate the relationship between education and conspiracy belief.

Like conspiracy belief, belief in the paranormal partly reflects a rejection of conventional or rational understandings of causality. As several studies have shown, just like conspiracy belief (Swami et al., 2014), belief in the paranormal is negatively associated with analytical thinking style (Gervais & Norenzayan, 2012; Pennycook et al., 2012; Shenhav, Rand & Greene, 2012). Further, paranormal beliefs strongly correlate with endorsement of conspiracy theories (Darwin et al., 2011; Newheiser et al., 2011; Stieger et al., 2013). It is therefore possible that the relationships observed in Study 1 are spurious because the tendency to attribute agency and intentionality in the environment is a specific example of a paranormal belief.

However, we argue that there is a crucial difference between conspiracy and paranormal beliefs. Specifically, unlike belief in the paranormal, belief in conspiracy theories does not depend on magical associations. People may be predisposed to invoke intentional, teleological explanations of natural phenomena and find these explanations satisfying (Kelemen, 2004) but this does not mean that these explanations must be about magical or supernatural occurrences. Therefore, whilst the preference for agency and intentionality explanations may be a specific example of a broader set of beliefs, it may be a unique type of cognitive error associated with education and belief in conspiracy theories. The tendency to attribute agency and intentionality may therefore explain the link between education and conspiracy belief whilst taking into account broader paranormal belief. Study 2 was therefore designed to examine whether the attribution of intentionality and agency uniquely accounts for the relationship between education level and conspiracy belief when taking into account the extent to which people generally believe in paranormal phenomena.

The study followed a similar procedure to Study 1. Participants were asked to complete the anthropomorphism scale (Waytz et al., 2010), the adapted Heider and

Simmel (1944) task and a measure of agreement with well-known conspiracy theories (Douglas & Sutton, 2011). Finally, participants completed a scale measuring the extent to which they show belief in paranormal phenomena such as superstition, clairvoyance, telepathy and a '6th sense' (Eckblad & Chapman, 1983) and were asked to complete the same demographic measures as in Study 1.

Method

Participants and Design

Three hundred and thirty workers from Amazon's Mechanical Turk™ were recruited to complete an online questionnaire (170 women, 158 men, 2 transgender/rather not say, M_{age} = 35.45, SD = 13.05). Of this sample, 79.5% were White/Caucasian, 7% African American, 7% Asian, 3% Hispanic, 1% Native American, 0.5% Pacific Islander and 2% Other. Forty five per cent indicated that they were Christian (e.g., Catholic, Baptist, Protestant, Methodist), 42% had no religion or were atheist, 3.5% agnostic, 2.5% Jewish, 2% Buddhist, 1% Hindu and 4% Other (e.g., 'spiritual' and wiccan). They were each paid US $1 for their time. The design of the study was correlational. The predictor variables were anthropomorphism, the tendency to perceive intentionality in inanimate shapes, paranormal beliefs, and a range of demographic factors as measured in Study 1. The dependent variable was belief in well-known conspiracy theories.

Materials and Procedure

As in Study 1, the online questionnaire was designed using the Qualtrics software and first presented participants with an information page where they were asked to give their informed consent. Participants then completed the measures in random order, except for the demographic measures which always appeared in the same order at the end of the questionnaire. [4] They were asked to read a series of statements related to

conspiracy theories as in Study 1, but this time there were 17 statements in total (Douglas & Sutton, 2011; α = .87). [5]

As in Study 1, participants also completed the individual differences in anthropomorphism scale (IDAQ; Waytz et al., 2010; α = .89). They were also asked to view the animation used by Heider and Simmel (1944) and answer the same questions as in Study. As in Study 1, the two types of questions used in the Heider and Simmel task were significantly correlated, $r(330) = .80$, $p < .001$ and an exploratory factor analysis using oblique rotation (promax) revealed one factor explaining 69.62 per cent of the variance. As in Study 1, we therefore combined the two types of questions into a single 10-item scale (α = .95). In contrast to Study 1, we note here that the two measures of HAD (anthropomorphism and perceived intentionality) were significantly correlated, $r(330) = .25$, $p < .001$.

Participants also completed a scale of paranormal beliefs (Eckblad & Chapman, 1983). Here, they read a series of 30 statements (e.g., "Some people can make me aware of them just by thinking about me", "I have sometimes felt that strangers were reading my mind") and were asked to rate their agreement on a five-point scale (1 = *strongly disagree*, 5 = *strongly agree*; α = .87). Finally, participants were asked to provide the same demographic details as in Study 1. At the completion of the questionnaire, participants were debriefed, thanked and paid.

Results and Discussion

Only two people indicated that they were transgender or would rather not say. We therefore examined if there was a gender difference in conspiracy belief between females and males. No such gender difference existed, $t(326) = -0.47$, $p = .641$. There was also no relationship between age and belief in conspiracy theories, $r(328) = -.08$, $p =$

.155. Gender and age were therefore not analysed further. As in Study 1, we also did not analyse results for ethnic or religious differences since numbers were too unequal.

Means and standard deviations for all variables, and correlations between variables, are presented in Table 4. Beliefs in conspiracy theories were positively correlated with paranormal beliefs, anthropomorphism, perceived intentionality, religiosity, and political conservatism. They were negatively correlated with education level, annual income and socioeconomic status. Also, paranormal beliefs were positively correlated with the two different measures of agency detection.

We entered all variables into a step-wise regression where Step 1 included demographic variables (R^2 change = .13, $F(5,321) = 10.88$, $p < .001$), Step 2 further included education level (R^2 change = .17, $F(1,322) = 14.69$, $p < .001$), and Step 3 further included anthropomorphism, perceived intentionality and paranormal belief (R^2 change = .40, $F(3,318) = 43.20$, $p < .001$). Findings of the final model are presented in Table 5. There was no evidence of collinearity (all tolerances > .60 and all VIF < 1.7). The overall regression model was significant, $F(9, 327) = 25.46$, $p < .001$ and accounted for 40.2% of the variance in conspiracy belief. As in Study 1, anthropomorphism was a significant predictor, but this time perceived intentionality was a marginal predictor ($p = .06$). Paranormal beliefs, political conservatism, education level and socioeconomic status also remained as significant predictors. Crucially however, despite the inclusion of paranormal beliefs and demographic variables that significantly predicted conspiracy belief, anthropomorphism and perceived intentionality remained significant predictors. That is, hypersensitivity to agency appears to be a unique predictor of beliefs in conspiracy theories.

To test the predicted pattern of mediation between education level and belief in conspiracy theories via attributions of intentionality, bootstrapped mediation analyses

(10,000 resamples) again examined the indirect effect of education level on conspiracy belief via anthropomorphism and perceived intentionality using the PROCESS macro for SPSS (model 4; see Hayes, 2013). Including age, religiosity, political conservatism, annual household income and perceived SES as covariates, there was an indirect effect of education level on belief in conspiracy theories via anthropomorphism but not responses on the Heider and Simmel task or paranormal belief (see Table 6). These results mirror those of Study 1.

As in Study 1, anthropomorphism and perceived intentionality were significant predictors of belief in conspiracy theories. Again, anthropomorphism accounted for the relationship between education level and belief in conspiracy theories. Crucially however, despite the inclusion of paranormal beliefs, anthropomorphism still uniquely accounted for the relationship between education level and belief in conspiracy theories.

General Discussion

The current studies demonstrate that education level predicts the extent to which people endorse conspiracy theories and that this relationship is mediated by the general tendency to attribute intentionality and agency where it does not exist, or is unlikely to exist. In Study 1, people with lower levels of education were more likely to endorse conspiratorial explanations for well-known events, and this occurred because they were also more likely to attribute agency and intentionality to inanimate objects. In Study 2, we replicated this effect and showed that it occurred even when taking into account more general beliefs in the paranormal. The current findings therefore suggest that conspiracy theorizing may partially be a consequence of a specific thinking style – assuming that events have an underlying intentional cause when they most likely do not – and that this thinking style may be somewhat changed by education.

Researchers have put forward a variety of suggestions for dealing with the influence of conspiracy theories, when negative consequences are anticipated (e.g., radicalization). For example, Sunstein and Vermeule (2009) proposed that governments may wish to ban conspiracy theories or impose a tax upon people who release material about conspiracy theories into the public domain. Alternatively, governments may put forward counterarguments or hire private parties for help, or to communicate counterarguments. Finally, officials could engage in "cognitive infiltration" by entering conspiracist groups and planting ideas to tempt people away from conspiracy theories. However, we know that conspiracy theories are resistant to correction (Sunstein & Vermeule, 2009; Jolley & Douglas, 2014b), so many of these suggestions may be – in addition to being arguably undemocratic and somewhat impractical – ineffective in addressing the consequences of conspiracy theories.

Although the correlations between education level and conspiracy belief were modest in the current studies, and therefore many other factors must predict belief in conspiracy theories, the current findings suggest that education may be one alternative factor in addressing any negative influence of conspiracy theories. Specifically, in the current studies individuals with higher levels of education were less likely to see intentionality everywhere and less likely to believe in conspiracy theories. Consistent with this finding, Swami et al. (2014) have recently proposed that making people more analytical thinkers may be one way to address potentially harmful conspiracy theories. They provide evidence that encouraging analytical thinking in a laboratory setting reduces conspiracy belief at least temporarily. There is also some evidence that time spent in education decreases susceptibility to the reasoning bias known as the 'myside bias' in which people evaluate, generate and test hypotheses in a way that is biased toward their own prior opinions and attitudes (Toplak & Stanovich, 2003).

However, education may not only equip people with analytical thinking skills. If this was the case in our research, we could perhaps expect the link between education and conspiracy belief to be mediated also by paranormal belief. Instead, education may equip people with the unique skills to understand non-intentional causality – that not everything happens intentionally, or for a purpose. What these exact tools may be is an important subject of future research. One potential approach may be to target critical thinking skills, which involve the ability and willingness to analyze, synthesize and evaluate arguments or evidence. Critical thinking skills allow individuals to determine whether conclusions follow logically from evidence, and to consider alternative explanations (e.g., Griggs, Jackson, Marek & Christopher, 1998). Perhaps critical thinking skills would enable individuals, long-term, to separate realistic, non-intentional causal explanations from those that attribute blame to others with little or no justification. Further research is needed to understand exactly why and how higher levels of education predict lower levels of conspiracy belief. Research may also consider ways in which other distal predictors of conspiracy belief may be intervened upon to reduce conspiracy beliefs that are potentially harmful.

Douglas, Sutton, Jolley and Wood (in press) propose such a proactive method of allaying the potentially harmful effects of conspiracy theories. As Douglas et al. noted, many of the known predictors of conspiracy belief are alterable. One of these predictors is the tendency to make errors in logical and probabilistic reasoning (Brotherton & French, 2014), and another is the tendency toward magical thinking (e.g., Darwin et al., 2011; Newheiser et al., 2011; Stieger et al., 2013; Swami, Coles et al., 2013). It is not clear whether these tendencies can be corrected (Eckblad & Chapman, 1983; Peltzer, 2003), but evidence suggests that they can be reduced by training in logic and in probability specifically (e.g., Agnoli & Krantz, 1989; Sedlmeier & Gigerenzer, 2001).

The current findings suggest that interventions targeting the automatic attribution of intentionality may be effective in reducing the tendency to believe in conspiracy theories.

In conclusion, it is important to note that addressing conspiracy theories in a broader educational context does not necessarily encourage people to reject conspiracy theories completely. Whilst some conspiracy theories may cause problems, some hold true and play an important part in making authorities responsible for their actions. It is therefore somewhat a value judgment whether intervening on conspiracy theories is ever appropriate. Rather, addressing conspiracy theories in an educational context may allow people to learn the tools to critically examine information about the causes of events and make informed rather than automatic judgments that the causes must have been intentional.

References

Abalakina-Paap, M., Stephan, W. G., Craig, T., & Gregory, L. (1999). Beliefs in conspiracies. *Political Psychology, 20*, 637–647. doi: 10.1111/0162-895X.00160

Agnoli, F., & Krantz, D. H. (1989). Suppressing natural heuristics by formal instruction: The case of the conjunction fallacy. *Cognitive Psychology, 21*, 515-550. doi: 10.1016/0010-0285(89)90017-0

Banerjee, K., & Bloom, P. (2014). Why did this happen to me? Religious believers' and non-believers' teleological reasoning about life events. *Cognition, 133*, 277-303. doi: 10.1016/j.cognition.2014.06.017

Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51*, 1173-1182. doi: 10.1037/0022-3514.51.6.1173

Barrett, J. L. (2004). *Why would anyone believe in God?* Walnut Creek, CA: AltaMira Press.

Barrett, J. L. (2007). Is the spell really broken? Bio-psychological explanations of religion and theistic belief. *Theology and Science, 5*, 57-72. doi: 10.1080/14746700601159564

Bartlett, J., & Miller, C. (2010). *The power of unreason: Conspiracy theories, extremism and counter-terrorism*. London: Demos.

Bird, S. T. & Bogart, L. M. (2003). Birth control conspiracy beliefs, perceived discrimination, and contraception among African Americans. *Journal of Health Psychology, 8*, 263–276. doi: 10.1177/1359105303008002669

Bogart, L. M. & Thorburn, S. T. (2005). Are HIV/AIDS conspiracy beliefs as barrier to HIV prevention among African Americans? *Journal of Acquired Immune Deficiency Syndromes, 38,* 213-218.

Bogart, L. M. & Thorburn, S. T. (2006). Relationship of African Americans' socio demographic characteristics to belief in conspiracies about HIV/AIDS and birth control. *Journal of the National Medical Association, 98,* 1144–1150.

Brinch, C. N., & Galloway, T. A. (2012). Schooling in adolescence raises IQ scores. *Proceedings of the National Academy of Sciences, 109,* 425-430. doi: 10.1073/pnas.1106077109

Brotherton, R., & French, C. C. (2014). Belief in conspiracy theories and susceptibility to the conjunction fallacy. *Applied Cognitive Psychology, 28,* 238-248. doi: 10.1002/acp.2995

Brotherton, R., French, C. C., & Pickering, A. D. (2013). Measuring belief in conspiracy theories: The generic conspiracist beliefs scale. *Frontiers in Psychology, 4,* 279. doi: 10.3389/fpsyg.2013.00279

Burger, J. M., & Cooper, H. M. (1979). The desirability of control. *Motivation and Emotion, 3,* 381-393.

Byford, J. (2011). *Conspiracy theories: A critical introduction*. Basingstoke UK: Palgrave MacMillan.

Callan, M. J., Sutton, R. M., Harvey, A. J., & Dawtry, R. J. (2014). Immanent justice reasoning: Theory, research and current directions. *Advances in Experimental Social Psychology, 49,* 105-161. doi: 10.1016/B978-0-12-800052-6.00002-0

Clarke, S. (2002). Conspiracy theories and conspiracy theorizing. *Philosophy of the Social Sciences, 32*, 131–150. doi: 10.1177/004931032002001

Coady, D. (2006). *Conspiracy theories: The philosophical debate*. Hampshire, UK: Ashgate.

Cozzolino, P. J. (2011). Trust, cooperation and equality: A psychological analysis of the formation of social capital. *British Journal of Social Psychology, 50,* 203-320. doi: 10.1348/014466610X519610

Darwin, H., Neave, N., & Holmes, J. (2011). Belief in conspiracy theories. The role of paranormal belief, paranoid ideation and schizotypy. *Personality and Individual Differences, 50,* 1289-1293. doi: 10.1016/j.paid.2011.02.027

Douglas, K. M., & Sutton, R. M. (2008). The hidden impact of conspiracy theories: Perceived and actual influence of theories surrounding the death of Princess Diana. *Journal of Social Psychology, 148,* 210–221. doi: 10.3200/SOCP.148.2.210-222

Douglas, K. M., & Sutton, R. M. (2011). Does it take one to know one? Endorsement of conspiracy theories is influenced by personal willingness to conspire. *British Journal of Social Psychology, 50,* 544-552. doi: 10.1111/j.2044-8309.2010.02018.x

Douglas, K. M., Sutton, R. M., Jolley, D., & Wood, M. J. (in press). The social, political, environmental and health-related consequences of conspiracy theories: Problems and potential solutions. In M. Bilewicz, A. Cichocka, W. Soral (Eds.), *The psychology of conspiracy.* Abingdon, Oxford, UK: Taylor and Francis.

Eckblad, M., & Chapman, L. J. (1983). Magical ideation as an indicator of schizotypy. *Journal of Consulting and Clinical Psychology, 51,* 215-225. doi: 10.1037/0022-006X.51.2.215

Fenster, M. (1999). *Conspiracy theories: Secrecy and power in American culture*. Minneapolis, MN: University of Minnesota Press.

Furnham, A. (2013). Commercial conspiracy theories: A pilot study. *Frontiers in Psychology, 4,* 379. doi: 10.3389/fpsyg.2013.00379

Gervais, W. M., & Norenzayan, A. (2012). Analytic thinking promotes religious disbelief. *Science, 336*, 493 - 496. doi: 10.1126/science.1215647

Goertzel, T. (1994). Belief in conspiracy theories. *Political Psychology*, *15*, 731–742.

Griggs, R. A., Jackson, S. L., Marek, P. and Christopher, A. N. (1998) Critical thinking in introductory psychology texts and supplements. *Teaching of Psychology*, 25, 254–66.

Groh, D. (1987). The temptation of conspiracy theory or: why do bad things happen to good people? Part I: Preliminary draft of a theory of conspiracy theories. In: Graumann. C.F. & Moscovici, S. (Eds.). *Changing conceptions of conspiracy.* (pp. 1-13). New York: Springer.

Guthrie, S. E. (1993). *Faces in the clouds: a new theory of religion*. Oxford: Oxford University Press.

Hayes, A. F. (2009). Beyond Baron and Kenny: Statistical mediation analysis in the new millennium. *Communication Monographs*, *76*, 408-420. doi: 10.1080/03637750903310360

Hayes, A. F. (2013). *Introduction to mediation, moderation and conditional process analysis: A regression-based approach*. New York: Guilford Press.

Heider, F. & Simmel, M. (1944). An experimental study of apparent behavior. *American Journal of Psychology*, *57,* 243-259.

Imhoff, R., & Bruder, M. (2014). Speaking (un-)truth to power: Conspiracy mentality as a generalised political attitude. *European Journal of Personality, 28,* 25-43. doi: 10.1002/per.1930

Jonason, P. K. & Webster, G. D. (2010). The dirty dozen: A concise measure of the dark triad. *Psychological Assessment, 22,* 420-432. doi: 10.1037/a0019265

Jolley, D., & Douglas, K.M. (2014a). The social consequences of conspiracism: Exposure to conspiracy theories decreases the intention to engage in politics and to reduce one's carbon footprint. *British Journal of Psychology, 105,* 35-56. doi: 10.1111/bjop.12018

Jolley, D., & Douglas, K.M. (2014b). The effects of anti-vaccine conspiracy theories on vaccination intentions. *PLOS ONE,* 9(2): e89177. doi: 10.1371/journal.pone.0089177

Kelemen, D. (1999). The scope of teleological thinking in preschool children. *Cognition, 70,* 241-272. doi: 10.1016/S0010-0277(99)00010-4

Kelemen, D. (2004). Are children "intuitive theists"? Reasoning about purpose and design in nature. *Psychological Science, 15,* 295-301. doi: 10.1111/j.0956-7976.2004.00672.x

Kelemen, D., & DiYanni, C. (2005). Intuitions about origins: Purpose and intelligent design in children's reasoning about nature. *Journal of Cognition and Development, 6,* 3-31. doi: 10.1207/s15327647jcd0601_2

Lanman, J. A. (2012). The importance of religious displays for belief acquisition and secularization. *Journal of Contemporary Religion, 27,* 49-65. doi: 10.1080/13537903.2012.642726

Leman, P. J. & Cinnirella, M. (2007). A major event has a major cause: Evidence for the role of heuristics in reasoning about conspiracy theories. *Social Psychological Review, 9,* 18-28.

Lewandowsky, S., Oberauer, K., & Gignac, G. (2013). NASA faked the moon landing-Therefore (climate) science is a hoax: An anatomy of the motivated rejection of science. *Psychological Science, 24,* 622-633. doi: 10.1177/0956797612457686

Lipsey, M., & Wilson, D. B. (2001). *Practical meta-analysis.* California: Sage Publications.

McCauley, C. & Jacques, S. (1979). The popularity of conspiracy theories of presidential assassination: a Bayesian analysis. *Journal of Personality and Social Psychology. 37,* 637-644. doi: 10.1037/0022-3514.37.5.637

McClure, J., Hilton, D. J., & Sutton, R. M. (2007). Judgements of voluntary and physical causes in causal chains: Probabilistic and social functionalist criteria for attributions. *European Journal of Social Psychology, 37,* 879-901. doi: 10.1002/ejsp.394

McHoskey, J. W. (1995). Case closed? On the John F. Kennedy assassination: Biased assimilation of evidence and attitude polarization. *Basic and Applied Social Psychology, 17,* 395–409. doi: 10.1207/s15324834basp1703_7

Miller, S. (2002). Conspiracy theories: public arguments as coded social critiques. *Argumentation and Advocacy, 39,* 40-56.

Newheiser, A. K., Farias, M., & Tausch, N. (2011). The functional nature of conspiracy beliefs: Examining the underpinnings of belief in the Da Vinci Code conspiracy. *Personality and Individual Differences, 58,* 1007-1011. doi: 10.1016/j.paid.2011.08.011

Oliver, J. E., & Wood, T. J. (2014). Conspiracy theories and the paranoid style(s) of mass opinion. *American Journal of Political Science, 58,* 952-966. doi: 10.1111/ajps.12084

Peltzer, K. (2003). Magical thinking and paranormal beliefs among secondary and university students in South Africa. *Personality and Individual Differences, 35,* 1419-1426. doi: 10.1016/S0191-8869(02)00359-8

Pennycook, G., Cheyne, J. A., Barr, N., Koehler, D. J., & Fugelsang, J. A. (2014). The role of analytic thinking in moral judgements and values. *Thinking and Reasoning, 20,* 188-214. doi: 10.1080/13546783.2013.865000

Plomin, R. S. & Post, J. M. (1997). *Political paranoia*. New Haven, CT: Yale University Press.

Riekki, T., Lindeman, M., & Raji, T. T. (2014). Supernatural believers attribute more intentions to random movement that skeptics: An fMRI study. *Social Neuroscience, 9,* 400-411. doi: http://dx.doi.org/10.1080/17470919.2014.906366

Ritchie, S. J., Bates, T. C., & Plomin, R. (2015). Does learning to read improve intelligence? A longitudinal multivariate analysis in identical twins from age 7 to 16. *Child Development, 86,* 23-36. doi: 10.1111/cdev.12272

Rosset, E. (2008). It's no accident: Our bias for intentional explanations. *Cognition, 108,* 771-780. doi: 10.1016/j.cognition.2008.07.001

Rubin, Z. & Peplau, L. A. (1975). Who believes in a just world? *Journal of Social Issues, 31,* 65-89. doi: 10.1111/j.1540-4560.1975.tb00997.x

Scholl, B. J., & Tremoulet, R. D. (2000). Perceptual causality and animacy. *Trends in Cognitive Sciences, 4,* 299-309. doi: 10.1016/S1364-6613(00)01506-0

Sedlmeier, P., & Gigerenzer, G. (2001). Teaching Bayesian reasoning in less than two hours. *Journal of Experimental Psychology: General, 130,* 380-400. doi: 10.1037//0096-3445.130.3.380

Shenhav, A., Rand, D. G., & Greene, J. D. (2012). Divine intuition: Cognitive style influences belief in god. *Journal of Experimental Psychology: General, 141*, 423-428. doi: 10.1037/a0025391

Snyder, C. R. & Fromkin, H. L. (1977). Abnormality as a positive characteristic: The development and validation of a scale measuring need for uniqueness. *Journal of Abnormal Psychology, 86,* 518-527. doi: 10.1037/0021-843X.86.5.518

Stieger, S., Gumhalter, N., Tran, U. S., Voracek, M., & Swami, V. (2013). Girl in the cellar: A repeated cross-sectional investigation of belief in conspiracy theories about the kidnapping of Natascha Kampusch. *Frontiers in Psychology*, *4*, 297. doi: 10.3389/fpsyg.2013.0029

Sunstein, C. R. & Vermeule, A. (2009). Conspiracy theories: Causes and cures. *Journal of Political Philosophy, 17,* 202–227. doi: 10.1111/j.1467-9760.2008.00325.x

Sutton, R. M., & Douglas, K. M. (2014). Examining the monological nature of conspiracy theories. In J-W. van Prooijen & P. A. M. van Lange (Eds.), *Power, politics and paranoia: Why people are suspicious of their leaders* pp. 254-272. Cambridge, UK: Cambridge University Press.

Swami, V. (2012). Social Psychological Origins of Conspiracy Theories: The Case of the Jewish Conspiracy Theory in Malaysia. *Frontiers in Psychology, 3,* 280. doi: 10.3389/fpsyg.2012.00280

Swami, V., & Coles, R. (2010). The truth is out there: Belief in conspiracy theories. *The Psychologist*, *23,* 560-563.

Swami, V., Chamorro-Premuzic, T., & Furnham, A. (2010). Unanswered questions: A preliminary investigation of personality and individual difference predictors of 9/11 conspiracist beliefs. *Applied Cognitive Psychology*, *24,* 749–761. doi: 10.1002/acp.1583

Swami, V., Coles, R., Stieger, S., Pietschnig, J., Furnham, A., Rehim, S., Voracek, M. (2011). Conspiracist ideation in Britain and Austria: Evidence of a monological belief system and associations between individual psychological differences and real-world and fictitious conspiracy theories. *British Journal of Psychology, 102,* 443-463. doi: 10.1111/j.2044-8295.2010.02004.x

Swami, V., Voracek, M., Stieger, S., Tran, U. S., & Furnham, A. (2014). Analytic thinking reduces belief in conspiracy theories. *Cognition, 133,* 572-585. 10.1016/j.cognition.2014.08.006

Thompson, M. M., Naccarato, M. E., & Parker, K. E. (1989). *Assessing cognitive need: The development of the personal need for structure and personal fear of invalidity scale.* Paper presented at the Annual Meeting for the Canadian Psychological Society. Halifax, Nova Scotia, Canada.

Toplak, M. E., & Stanovich, K. E. (2003). Associations between myside bias on an informal reasoning task and amount of post-secondary education. *Applied Cognitive Psychology, 17,* 851-860. doi: 10.1002/acp.915

Tversky, A., & Kahneman, D. (1983). Extensional versus intuitive reasoning: The conjunction fallacy in probability judgement. *Psychological Review,* 90, 293-315. doi: 10.1037/0033-295X.90.4.293

Uscinski. J. E., & Parent, J. M. (2014). *American conspiracy theories.* New York: Oxford University Press.

van Prooijen, J.-W., & Jostmann, N. B. (2013). Belief in conspiracy theories: The influence of uncertainty and perceived morality. *European Journal of Social Psychology , 43,* 109-115. doi: 10.1002/ejsp.1922

van Prooijen, J.-W., & van Dijk, E. (2014). When consequence size predicts belief in conspiracy theories: The moderating role of perspective taking. *Journal of Experimental Social Psychology, 55,* 63-73. doi: 10.1016/j.jesp.2014.06.006

Waytz, A., Cacioppo, J., & Epley, N. (2010). Who sees human? The stability and importance of individual differences in anthropomorphism. *Perspectives on Psychological Science, 5,* 219-232. doi: 10.1177/1745691610369336

Welzel, C., Inglehart, R., & Deutsch, F. (2005). Social Capital, Voluntary Associations and Collective Action: Which Aspects of Social Capital Have the Greatest 'Civic' Payoff? *Journal of Civic Society, 2,* 121-146. doi: 10.1080/17448680500337475

Wood, M. J., & Douglas, K. M. (2013). "What about building 7?" A social psychological study of online discussion of 9/11 conspiracy theories. *Frontiers in Psychology, 4,* 409. doi: 10.3389/fpsyg.2013.00409

Wood, M., Douglas, K. M., & Sutton, R. M. (2012). Dead and alive: Beliefs in contradictory conspiracy theories. *Social Psychological and Personality Science, 3,* 767-773. doi: 10.1177/1948550611434786

Yamagishi, T. & Yamagishi, M. (1994). Trust and commitment in the United States and Japan. *Motivation and Emotion, 18,* 129-166.

Table 1. Means, (standard deviations) and correlations between all variables measured in Study 1.

Measures	*M* (*SD*)	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Conspiracy belief	2.75 (1.28)	--	.35**	.17*	-.20**	-.09	.27**	-.13+	-.13+	-.06
2. Anthropo-morphism	3.67 (1.55)		--	.11	-.28***	-.36***	.12	-.21**	-.11	-.09
3. Perceived intentionality	3.23 (1.18)			--	.02	-.02	.12+	.03	-.02	.05
4. Age	32.4 (12.20)				--	.23**	.12+	.21**	.21**	.04
5. Religiosity	1.74 (.90)					--	.34***	.19**	-.02	.16*
6. Political conservatism	3.46 (1.46)						--	.02	-.01	.07
7. Education level	3.68 (0.78)							--	.28***	.29***
8. Annual household income	5.08 (2.98)								--	.46***
9. Socioeconomic status	2.96 (1.73)									--

* $p < .05$, ** $p < .01$, *** $p < .001$, + $p < .10$

Table 2. Regression coefficients for the analyses of Study 1 (dependent variable is conspiracy belief)

Predictor variable	β	*t*
Anthropomorphism	.249	3.65***
Perceived intentionality	.130	2.00*
Age	-.160	-2.27*
Religiosity	.078	1.10
Political conservatism	.224	3.26**
Education level	-.051	-.73
Annual household income	.030	.40
Socioeconomic status	-.037	-.50

* $p < .05$
** $p < .01$
*** $p < .001$

Table 3. Simple mediation of the indirect effects of education level on belief in conspiracy theories through anthropomorphism, and responses on the Heider and Simmel task (Study 1).

	Effect	Boot SE	BootLLCI	BootULCI
TOTAL	-.0566	.0436	-.1573	.0174
Anthropomorphism	-.0631	.0369	-.1593	-.0075
Heider and Simmel	.0066	.0171	-.0212	.0504

Table 4. Means, (standard deviations) and correlations between all variables measured in Study 2.

Measures	*M* (*SD*)	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Conspiracy belief	2.40 (1.19)	--	.41**	.22*	-.08	.19**	.28**	-.26**	-.12*	-.16	.52***
2. Anthropo-morphism	3.64 (1.59)		--	.25***	-.23**	.09+	.07	-.19**	-.07	-.05	.49***
3. Perceived intentionality	2.95 (1.26)			--	.03	.03	.00	-.05	.02	-.01	.22***
4. Age	35.45 (13.05)				--	.26***	.20***	.09	.08	-.01	-.25***
5. Religiosity	2.01 (1.07)					--	.33***	.00	-.04	-.04	.14*
6. Political conservatism	3.58 (1.67)						--	.03	.13*	.10	.02
7. Education level	3.71 (0.80)							--	.31***	.27***	-.15**
8. Annual household income	5.39 (3.04)								--	.59***	-.16**
9. Socioeconomic status	3.34 (1.60)									--	-.09
10. Paranormal belief	3.93 (0.68)										--

* $p < .05$, ** $p < .01$, *** $p < .001$, + $p < .10$

Table 5. Regression coefficients for the analyses of Study 2 (dependent variable is conspiracy belief).

Predictor variable	β	*t*
Anthropomorphism	.166	3.21**
Perceived intentionality	.085	1.89+
Age	.007	.144
Religiosity	.021	.45
Political conservatism	.263	5.68***
Education level	-.134	-2.77**
Annual household income	.050	.919
Socioeconomic status	-.150	-2.77**
Paranormal belief	.394	7.71***

\+ $p = .060$
* $p < .05$
** $p < .01$
*** $p < .001$

Table 6. Simple mediation of the indirect effects of education level on belief in conspiracy theories through anthropomorphism, responses on the Heider and Simmel task, and paranormal belief (Study 2).

	Effect	Boot SE	BootLLCI	BootULCI
TOTAL	-.1055	.0479	-.2036	-.0143
Anthropomorphism	-.0444	.0221	-.1028	-.0121
Heider and Simmel	-.0084	.0095	-.0380	.0030
Paranormal belief	-.0526	.0344	-.1234	.0122

Footnotes

1 The current study was part of a larger-scale investigation including measures that form part of a separate project. These were the extent to which participants felt that they themselves would take part in real-world conspiracies if placed in the situation of the alleged conspirators (Douglas & Sutton, 2011), personal need for structure (Thompson, Naccarato & Parker, 1989), desirability of control (Burger & Cooper, 1979), just world beliefs (Rubin & Peplau, 1975), trust (Goertzel, 1994; Yamagishi & Yamagishi, 1994), the dark triad of personality (Jonason & Webster, 2010), and immanent justice reasoning based on ambiguous scenarios (Callan, Sutton, Harvey & Dawtry, 2014). We also included paranormal beliefs in this study (Eckblad & Chapman, 1983) but due to an error in the randomization of scales, we were not able to analyse the results.

2 A meta-analysis showed that the weighted mean correlation between conspiracy belief and education level across Studies 1 and 2 (fixed effects) was significant, r = -.21, 95% CI = [-.29, -.13], Z = 4.93, p < .001 (Lipsey & Wilson, 2001).

3 We measured these variables again in Study 2, and in contrast to Study 1 they were significantly correlated. Note however that a Fisher r-to-z transformation revealed that the coefficients for Study 1 and Study 2 were not significantly different (z = -.161, p = .107). Therefore, the different finding across the two studies could simply be due to variation around conventional p-values.

4 As was the case for Study 1, Study 2 was part of a larger-scale investigation including measures that form part of a separate project. These were uniqueness-seeking (Snyder & Fromkin, 1977), preference for intentional causes as attributions (McClure et al., 2007), social capital (Cozzolino, 2011; Welzel, Ingelhard & Deutsch, 2005), just

world beliefs (Rubin & Peplau, 1975), and immanent justice reasoning based on ambiguous scenarios (Callan et al., 2014).

5 Participants also completed a scale of generic conspiracist ideation (Brotherton, Pickering & French, 2013) where they were asked to rate the extent to which they think that 10 statements are true (e.g., "The government is involved in the murder of innocent citizens and/or well-known public figures, and keeps this a secret", 1 = *definitely not true*, 5 = *definitely true*; $\alpha = .95$). Brotherton et al. have argued that measuring conspiracy beliefs via agreement with popular conspiracy theories can be problematic because many conspiracy theories are culture-specific. However, the patterns of results were the same as for the well-known conspiracy theories scale we report so we do not report the results for the Brotherton et al. (2013) scale here.